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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CHEN, KEATH T	
ART UNIT	**PAPER NUMBER**
1712	

NOTIFICATION DATE	DELIVERY MODE
02/08/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary	Application No.	Applicant(s)	
	10/591,391	STOLT ET AL.	
	Examiner	Art Unit	
	KEATH T. CHEN	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 January 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *63-74 and 80-96* is/are pending in the application.

4a) Of the above claim(s) *63-74,95 and 96* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *80-94* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/05/2010,09/01/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicants' election without traverse of Invention Group II, Species A2 (Figs. 11-14) and B3 (Fig. 10) in the reply filed on 01/06/2011 is acknowledged.

Applicants designated claims 80-94 readable of the elected species and cancelled invention Group I (claims 49-62 and 75-79).

The examiner notices that Claim 82 read into Fig. 15 and group Fig. 15 as part of Species A2.

1. Claims 64-74 and 95-96 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 01/06/2011.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 86 and 89 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 86 recites the limitation of "measures the composition of the CIGS layer directly", it is not clear in what sense is a sensor measure directly? Directly on the surface of the sensor? Or directly as proximate to the substrate to receive the vapor directly? Or measure the properties of the film formed on the substrate

as directly? Although paragraph [0076] gives one example of measurement device, it is not clear exact definition of direct and indirect measurement.

Similar claim 89 recites the limitations of "measures the composition of the CIGS layer indirectly"

Claims 86 and 89 will be examined inclusive all of the above interpretations.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 80-81, 85-86, 88-89, and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 5141564, hereafter '564), in view of Regittnig (US 20010022992, hereafter '992).

'564 teaches some limitations of:

Claim 80: in-line system 80 for forming the material (Fig. 3, col. 6, lines 45-46) CIGS thin film (col. 1, line 65, the claimed “in-line continuous substrate flow production apparatus for fabrication of copper indium gallium diselenide (CIGS) solar cells”):

A vacuum chamber 84 (col. 6, line 49, the claimed “a CIGS process chamber”) a suitable back metal contact 32 (i.e., conductive metal layer) is deposited on one surface of the substrate 31. Excellent results are obtained using molybdenum (col. 3, lines 39-41, the claimed “substrates provided with a molybdenum back contact layer continuously move through a deposition zone (DZ) in the CIGS process chamber”),

Adjustable temperature controller 98, 100, 102 and heating coils 99, 101, 104 (col. 6, lines 60-65 and col. 7, lines 9-14, the claimed "the process chamber comprises a plurality of separated substrate heaters”),

simultaneously introduce gallium, copper, indium, and selenium into the chamber from independently heated and controlled (col. 5, lines 4-6, the claimed “evaporation sources with Cu, In, Ga and Se, and source heaters”)

Control of evaporation rates for the various elements is accomplished by a quartz crystal controller for Se and an electron impact emission spectroscopy evaporation rate controller for the Cu, Ga, and In (col. 5, lines 48-51, through these sensors a composition gradient is derived, see abstract, the claimed “at least one composition detection device for detecting the respective amounts of deposited elements in the CIGS, and a controller connected to said at least composition detection device and adapted to adjust the evaporant fluxes in the

respective rows in response to a detected variation in deposited amount of the corresponding element in order to provide a CIGS layer of uniform composition of elements", note the control of rate requires a controller, either automatically or manually, see also '564's claim 39 (c)).

'564 teaches only one row of evaporation source, therefore, does not explicitly teaches the other limitations of:

Claim 80: the sets of evaporation sources provided in rows over the width of a substrate, (at least one composition detection device for detecting the respective amounts of deposited elements in the CIGS) at each of the rows

'992 is an analogous art in the field of evaporation apparatus, particularly adapted to an evaporation plant for forming thin layers on a substrate (title), particular in solar modules ([0001]). '992 teaches plurality of rows of evaporation sources 11 can be placed side by side, in order to vaporize (metallize) the width of the substrate 8 as well as the whole length thereof with one pass ([0021]).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have duplicated the rows of evaporation sources side by side in width direction of the substrate, as taught by '992, for the gallium, copper, indium, and selenium sources in Fig. 3 of '564, for the purpose of metalize the width of the substrate in one pass, as taught by '992 ([0021]).

Note a person of ordinary skill in the art would have known to have duplicated the sensors and control of the additional rows independently.

Claim 81 is rejected for substantially the same reason as discussed above (note '564 is to generate uniform grain size, col. 5, lines 53-55).

Fig. 3 of '564 shows "the evaporant vapor sources are arranged at a level below the substrates" of claim 85; quartz crystal controller for Se and an electron impact emission spectroscopy evaporation rate controller for the Cu, Ga, and In (col. 5, lines 48-51, the claimed "composition detection device is a device that measures the composition of the CIGS layer directly", of claims 86 and 89, see 35 USC 112 rejection above, and quartz crystal is capable of measuring total thickness, the claimed "a separate thickness measuring device connected to the controller for measuring the thickness of the deposited CIGS layer is provided, and the controller is adapted to adjust the fluxes from the evaporant sources to in response to a detected thickness variation in order to provide a CIGS layer of uniform thickness" of claim 91); simultaneously introduce gallium, copper, indium, and selenium into the chamber from **independently** heated and **controlled** (col. 5, lines 4-6, the claimed "the controller is adapted to receive as input signal a signal representative of the total deposited amounts of each element and in response to said latter signal adjust the fluxes from the evaporant sources in order to provide a uniform thickness of the CIGS film" of claim 88).

4. Claim 82 is rejected under 35 U.S.C. 103(a) as being unpatentable over ‘564 and ‘992, further in view of Yamazaki et al. (US 20020139303, hereafter ‘303).

‘564 and ‘992, together, teach all limitations of claim 80, as discussed above. ‘992’s teaching that plurality of rows of evaporation sources 11 can be placed side by side, in order to vaporize (metallize) the width of the substrate 8 ([0021], the claimed “there are two rows of vapour sources arranged over the width of the process chamber as seen in the transport direction of the substrates, wherein the two rows of evaporation sources are arranged at each side of along which substrates flow through the deposition chamber" of claim 82.

Both ‘564 and ‘992 are silent on the position of the vapour sources relative to the substrate path, therefore, does not explicitly teach the limitations of:

Claim 82: (the two rows of evaporation sources are arranged at each side of and) outside the path along which substrates flow through the deposition chamber.

‘303 is an analogous art in the field of deposition apparatus (title), particularly using a plurality of evaporation sources (abstract). ‘303 teaches a plurality of rows of evaporation sources 306 ([0092]) outside the substrate transport path ([0095]) as shown in Fig. 3A).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have positioned the evaporation sources outside of substrate transport path, as taught in Fig. 3A of '303, to the combined apparatus of '564 and '992, for its suitability with predictable results. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

5. Claim 83-84 and 90 are rejected under 35 U.S.C. 103(a) as being unpatentable over '564 and '992, further in view of Nishitani et al. (US 5633033, hereafter '033).

'564 and '992, together, teach all limitations of claim 80, as discussed above.

'564 and '992, together, do not teach limitations of:

Claim 83: said at least one composition detection device is provided within the process chamber.

Claim 84: said at least one composition detection device is provided outside the process chamber.

Claim 90: said at least one composition detection device is a resistance measuring device.

'033 is an analogous art in the field of apparatus for manufacturing solar cell (field of the invention). '033 teaches detection … an electric resistance of the thin film layer is increasing with the change in its composition (col. 5, lines 38-

40). Note such resistance measurement of thin film required to be in-situ (within the process chamber of claim 83). '033 also shows the use of IR reflection to indicate composition (Fig. 5, col. 8, lines 10-19) and the sensor can be inside or outside the chamber (Fig. 3 and 4, respectively).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have added/replaced the composition measurement (for claim 90) with a in-situ resistance measurement of the thin film or with an IR reflection detection outside the process chamber (for claim 84), as taught by '033, to the combined apparatus of '564 and '992, for its suitability with predictable results. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

6. Claim 87 is rejected under 35 U.S.C. 103(a) as being unpatentable over '564 and '992, further in view of Bachmann et al. (US 4121238, hereafter '238).

'564 and '992, together, teach all limitations of claim 80, as discussed above.

'564 and '992, together, do not teach limitations of:

Claim 87: said at least one composition detection device is an X-ray fluorescence device and/or an EDX (energy dispersion X-ray spectroscopy)

device adapted to measure the total deposited amounts of each element and thereby also the thickness of the CIGS layer.

'238 is an analogous art in the field of metal oxide/indium phosphide device (title), including solar cell (abstract). '238 teaches the use of x-ray fluorescence to determine the composition (col. 3, lines 18-43).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have added/replaced the composition measurement with a x-ray fluorescence, as taught by '238, to the combined apparatus of '564 and '992, for its suitability with predictable results. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

7. Claim 92 is rejected under 35 U.S.C. 103(a) as being unpatentable over '564 and '992, further in view of Kuchinski et al. (US 20050072461, hereafter '461).

'564 and '992, together, teach all limitations of claim 80, as discussed above.

'564 and '992, together, do not teach limitations of:

Claim 92: thickness measuring device is a profilometer.

‘461 is an analogous art in the field of coating of CIGS film (abstract). ‘461 teaches the use of commercial available profilometer to measure the film thickness ([0109]).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have added/replaced a profilometer, as taught by ‘461, to the combined apparatus of ‘564 and ‘992, for its suitability with predictable results. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

8. Claim 93-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over ‘564 and ‘992, further in view of Beck et al. (US 20020106873, hereafter ‘873).

‘564 and ‘992, together, teach all limitations of claim 80, as discussed above. ‘564 teaches Cu, In, Ga sequence in Fig. 3 (the claimed “there are evaporant sources with Cu, Ga and In”).

‘564 and ‘992, together, do not teach limitations of:

Claim 93: the evaporant sources are arranged in the following order as seen in the transport direction of a substrate: Ga, Cu, In.

‘873 is an analogous art in the field of fabricating solar cell ([0036]) a CIGS film ([0052]). ‘791 teaches type (k) (In--Se /Ga--Se/Cu--Se/In--Se) ([0101]).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have re-arranged the order of evaporant sources as Ga, Cu, In, as taught by '873, to the combined apparatus of '564 and '992, for the purpose of generate type k solar cell.

'564 further teaches a Gallium source in the downstream process area 90 for doping the CdZnS layer (col. 7, lines 6-8, the claimed "a further evaporation source with Ga arranged downstream the In evaporation source" of claim 94).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEATH T CHEN/
Examiner, Art Unit 1712